interfaces, said copper sheet being attached to [the inert] said chromium metal layer of the carbon steel sheet at its borders and defining a substantially uncontaminated central zones inwardly of the edges of the sheets and unjoined at the interfaces.

Claim 4, line 1, delete "3" and insert therefore --1--.

Claim 6, line 1, delete "3" and insert therefore --4--.

Claim 7, line 1, delete "3" and insert therefore --4--.

Claim 10, line 2, delete "inert" and insert therefore --chromium--.

REMARKS

The action by the Examiner in this application, together with the cited reference, has been given careful consideration. Following such consideration, claims 2 and 3 have been canceled and claims 1, 4, 6, 7 and 10 have been amended to define more clearly the patentable invention Applicant believes is disclosed herein. It is respectfully requested that the Examiner reconsider the claims in their present form, together with the following comments, and allow the application.

As the Examiner well knows, the present invention relates to a component for use in manufacturing printed circuit boards, and more particularly to a laminate structure comprised of one or more copper layers adhered to a metallic support substrate. In such components, it has been known to use metals such as aluminum, stainless steel and copper to form the disposable substrate. In addition to the cost of such materials, copper and aluminum are relatively soft metals and can be susceptible to image transfer during lamination of multi-layer laminates, particularly at high lamination pressures and temperatures. Stainless steel is a stronger metal than copper or aluminum, and does possess the corrosion resistance necessary to avoid contamination of the copper sheet. However, stainless steel is much more expensive than copper or aluminum sheets.

The present invention relates to the use of a carbon steel sheet as the discardable, protective substrate. To prevent contamination of the copper foil, the surfaces of the carbon steel sheet include a thin chromium metal layer. A carbon steel sheet coated with chromium metal provides acceptable structural strength at significantly less cost than stainless steel. Further, a carbon steel support substrate has essentially the same coefficient of thermal expansion as the press plates that conventional, multi-opening presses use in forming printed circuit boards.

In response to the Examiner's objections, claim 1 has been amended to identify the inert metal layer on the carbon steel support substrate. Applicant respectfully submits that the cited reference does not teach, suggest or show the use of carbon steel having inert metals thereon.

The claims stand rejected under 35 U.S.C. §102 as being anticipated by U.S. Patent No. 5,512,381 to Konicek et al. The '381 patent teaches a laminate comprised of copper applied to a protective sheet of copper. The '381 patent also teaches that stainless steel, aluminum-bronze, brass, nickel and silver could also be used. The '381 reference does not teach or suggest the use of carbon steel having a chromium metal protective layer thereon. Specific reference to stainless steel in the '381 reference suggests that the Patentee did not consider ordinary carbon steel as a suitable support substrate.

By providing a thin, protective layer of chromium metal on the carbon steel, the present invention provides a low-cost alternative to stainless steel that provides the acceptable physical properties. The use of a coated carbon steel significantly reduces the cost of the protective support substrate even when compared to the other metals mentioned in the '381 patent. For the foregoing reasons, Applicant respectfully submits that the cited reference does not teach, suggest or show carbon steel with an inert metal layer thereon for use in supporting copper foil.

Attached hereto is a SUPPLEMENTAL INFORMATION DISCLOSURE STATEMENT citing U.S. Patent No. 5,153,050 and U.S. Patent No. 5,942,315, both to Johnston. The '050 patent was discussed in the "Background of the Invention," but not included in the INVENTION DISCLOSURE STATEMENT filed on March 24, 1999. The '315 patent teaches the use of a nickel alloy sheet as a discardable element. Also enclosed are copies of recently issued U.S. Patent Nos. 6,127,051 and 6,129,998, both to Frater, that disclose copper/steel laminated sheets for use in manufacturing printed circuit boards.

Favorable action is respectfully requested.

Respectfully submitted,

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